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POPULATION STATISTICS.—*The progressive adjustment of age distribution to fecundity.*[1] ALFRED J. LOTKA, Statistical Bureau, Metropolitan Life Insurance Company, New York.

It has been shown elsewhere[2] that, given a fixed age schedule of fecundity, that is to say, of maternity frequency among the females of a population, and given also a fixed age schedule of mortality (life table), the population will, in the absence of immigration and emigration, ultimately settle down to a certain definite age distribution, no matter what may have been the initial age distribution;[3] and the form of this ultimate age distribution has also been given.

The successive stages through which the population passes from the original to the final age distribution have not, however, been previously determined numerically,[4] neither has the lapse of time required for the adjustment been hitherto discussed. In what follows a numerical example will be treated so as to supply the missing information.

As a basis for the computation we shall take the white female population of the United States in 1920. The age distribution of this is exhibited, in quinquennial groups, in column (2) and (3) of Table 1.

The first step in the computation is to determine the age distribution of the survivors, in 1925, of this population of 1920. The population between the ages 20 and 25 in 1925, for example, was obtained by

[1] Received September 25, 1926.

[2] LOTKA, A. J. Phil. Mag. April, 1911, p. 435; Proc. Nat. Acad. Science 8: 339. 1922. *Elements of Physical Biology*, 1925, p. 110.

[3] Provided only that the initial age distribution was not so radically abnormal as to cause a complete cessation of reproduction.

[4] Compare, however, E. CANNAN, Economic Journal 5: 21. 1895.

TABLE 1.—UNITED STATES WHITE FEMALE POPULATION, ON BASIS OF 1920 AGE DISTRIBUTION AND AGE SCHEDULE OF FECUNDITY AND MORTALITY

AGE GROUP	1920		1925	1930	1935	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985		ULTIMATE	AGE GROUP
All ages	46,390,260		49,077,859	51,727,182	54,346,986	56,909,865	59,351,934	61,639,132	63,786,216	65,835,001	67,835,461	69,828,865	71,828,216	73,849,716	75,901,902			All ages
0–54	41,225,839		43,181,915	45,001,854	46,748,231	48,284,138	49,813,002	51,143,649	52,579,022	54,196,761	55,652,328	57,041,957	58,577,945	60,307,256	62,041,898			0–54
		per cent	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*		*per cent*	*per cent*	
All ages 0–54		100.00 88.87	100.00 87.99	100.00 87.00	100.00 85.02	100.00 84.84	100.00 83.93	100.00 82.97	100.00 82.43	100.00 82.32	100.00 82.04	100.00 81.69	100.00 81.55	100.00 81.86		100.00 81.74	100.00 81.61	All ages 0–54
0–4	5,118,209	11.03	10.21	10.08	10.00	9.91	9.78	9.62	9.51	9.46	9.46	9.47	9.47	9.46	7,165,646	9.44	9.48	0–4
5–9	4,902,920	10.76	10.19	9.52	9.40	9.33	9.29	9.19	9.09	9.01	8.96	8.98	8.99	9.00	6,824,434	8.99	8.98	5–9
10–14	4,638,706	10.00	10.06	9.58	8.98	8.88	8.86	8.85	8.81	8.71	8.65	8.62	8.74	8.67	6,583,237	8.67	8.64	10–14
15–19	4,176,406	9.00	9.33	9.46	9.01	8.45	8.39	8.42	8.46	8.41	8.34	8.29	8.28	8.30	6,319,177	8.33	8.31	15–19
20–24	4,170,841	8.99	8.32	8.52	8.79	8.40	7.93	8.00	7.97	8.01	7.99	7.94	7.88	7.88	5,994,555	7.90	7.91	20–24
25–29	4,051,348	8.73	8.24	7.66	8.00	8.15	7.82	7.40	7.42	7.48	7.54	7.53	7.48	7.44	5,644,290	7.44	7.47	25–29
30–34	3,566,009	7.69	7.98	7.56	7.05	7.38	7.53	7.27	6.92	6.94	7.01	7.08	7.07	7.04	5,313,738	7.00	7.03	30–34
35–39	3,303,693	7.12	7.01	7.31	6.95	6.50	6.75	7.01	6.80	6.47	6.50	6.58	6.64	6.65	5,016,417	6.61	6.59	35–39
40–44	2,770,843	5.97	6.49	6.43	6.71	6.40	6.00	6.35	6.54	6.34	6.06	6.10	6.17	6.24	4,734,855	6.24	6.16	40–44
45–49	2,411,222	5.20	5.41	5.91	5.86	6.14	5.89	5.54	5.89	6.07	5.90	5.64	5.68	5.76	4,416,970	5.82	5.74	45–49
50–54	2,025,642	4.37	4.66	4.87	5.33	5.31	5.58	5.37	5.08	5.40	5.58	5.43	5.19	5.24	4,028,779	5.31	5.30	50–54
55–59	1,566,541	3.38	3.85	4.10	4.30	4.72	4.72	4.98	4.82	4.57	4.86	5.03	4.90	4.69	3,587,295	4.73	4.79	55–59
60–64	1,311,095	2.83	2.87	3.26	3.50	3.69	4.06	4.08	4.33	4.19	3.98	4.24	4.39	4.28	3,112,638	4.10	4.19	60–64
65–69	926,422	2.00	2.27	2.32	2.63	2.85	3.01	3.33	3.36	3.56	3.46	3.29	3.51	3.64	2,690,630	3.54	3.50	65–69
70–74	643,451	1.39	1.47	1.68	1.71	1.96	2.12	2.25	2.51	2.52	2.68	2.61	2.48	2.65	2,068,417	2.75	2.64	70–74
75–79	410,696	0.89	0.89	0.95	1.09	1.11	1.28	1.39	1.48	1.65	1.67	1.78	1.73	1.65	1,334,255	1.76	1.76	75–79
80–84	201,199	0.43	0.46	0.47	0.50	0.57	0.59	0.68	0.74	0.79	0.89	0.89	0.95	0.93	672,759	0.89	0.95	80–84
85–89	80,306	0.17	0.17	0.18	0.18	0.20	0.23	0.24	0.27	0.30	0.32	0.36	0.36	0.39	284,612	0.37	0.41	85–89
90–94	19,880	0.04	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.09	0.10	0.10	78,575	0.10	0.11	90–94
95–99	4,129	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	10,129	0.01	0.04	95–99
100 or over	702														694		0.01	100 or over

multiplying the population between the ages 15 and 20 in 1920[5] by the factor $l_{22.5} / l_{17.5}$. Similarly all the other age groups from age five to the end of life, in 1925, were computed. The age group 0–5 cannot, of course, be found by this method, but must be derived from the births in the quinquennium 1920–1925. These were estimated as follows:

For 1920 the birth rate of white females was known from official sources.

For 1925 the birth rate of daughters was computed by multiplying the female population in each age group from 10 to 54 in 1925 by the corresponding[6] maternity frequency, as shown in Table 2. The sum

TABLE 2.—SURVIVORS, IN 1925, OF UNITED STATES WHITE FEMALE POPULATION 1920; ALSO, MATERNITY FREQUENCY 1920, AND RESULTING BIRTHS PER ANNUM

(1) AGE	(2) NUMBER	(3) MATERNITY FREQUENCY DAUGHTERS PER 100,000 FEMALES PER ANNUM*	(4) = (2) × (3)
10–14	4,943,467	9	445
15–19	4,579,575	2202	100,842
20–24	4,084,269	7310	298,560
25–29	4,046,509	7480	302,679
30–34	3,915,636	5780	226,324
35–39	3,443,082	3898	134,211
40–44	3,186,211	1552	49,450
45–49	2,657,507	172	4,571
50–54	2,284,954	5	114
10–54	33,141,210		1,117,196

* According to Birth Statistics for the Birth Registration Area of the United States, Sixth Annual Report, Census Bureau, 1920 p. 169; United States Census Report, 1920, 2: 162, after distributing the "unknown."

of the products so obtained, taken over all the reproductive age groups, gives the total births of daughters.

[5] The values of l_x used here and throughout the work were those given by E. Foudray in the "United States Abridged Life Tables 1919-20" for white females, "Aggregate" of all available States. These tables give l_x and q_x for ages 2, 7, 12, etc. From these $l_{2.5}$, $l_{7.5}$ etc. are easily obtained by the usual actuarial methods.

[6] That is, the numbers of daughters born per annum per head of white female population in each age group. The numerical data required are to be found in the "Birth Statistics for the Registration Area of the United States 1920," pp. 44 et seq. (Population by States) and pp. 168 et seq. (Births by Sex and by Age of Mother). The totals for 23 states were obtained by actual addition, instead of using the totals given in the "Summary" on p. 44, as this latter includes the State of Maine, for which only the gross number of births is available without classification by age of mother.

For intervening years, 1921–1924, total births were estimated by simple linear interpolation.

Having thus obtained values of the total births of daughters for the years 1920–1925, the survivors in the age group 0–5 in 1925 were computed as follows: Denoting by B_{1920}, B_{1921}, etc., the total births in the year 1920, 1921, etc., the survivors in question were determined as the sum

$$B_{1920}\ l_{4.5} + B_{1921}\ l_{3.5} + B_{1922}\ l_{2.5} + B_{1923}\ l_{1.5} + B_{1924}\ l_{0.5}$$

The complete age distribution of the white female population in 1925 having thus been determined, a simple repetition of the process gives the age distribution for 1930, a second repetition gives the distribution for 1935, and so on.

TABLE 3.—BIRTHRATE, DEATHRATE, AND RATE OF NATURAL INCREASE, UNITED STATES WHITE FEMALES 1920–1985, COMPUTED ON BASIS OF FECUNDITY AND MORTALITY AGE SCHEDULES AS OF 1920

	1920	1925	1930	1935	1940	1945
Birthrate b (daughters, per annum, per head of female population)	2.340	2.276	2.247	2.232	2.200	2.156
Death rate d (deaths of females, per annum, per head of female population)	1.241	1.191	1.228	1.277	1.319	1.358
Rate of increase $r = b - d$	1.099	1.085	1.019	0.955	0.881	0.798

	1950	1955	1960	1965	1970	1975	1980	1985	∞*
b	2.120	2.100	2.094	2.097	2.098	2.094	2.089	2.087	2.091
d	1.400	1.442	1.479	1.508	1.526	1.534	1.537		1.544
r	0.720	0.658	0.615	0.589	0.572	0.560	0.552		0.547

* Computed by formulae (1), (2).

The computation was carried as far as the year 1985. The resulting figures, and also the ultimate age distribution after complete adjustment ("after an infinite lapse of time") are shown in successive columns of Table 1. For the sake of economy in typesetting, percentages only, not actual numbers, are shown for certain years, though the actual numbers were calculated in carrying out the computation. It will be seen that by 1985 the "ultimate" or fixed age distribution is very nearly attained. Table 3 and Figure 1 show the birthrates per head

and natural rate of increase per head obtained by simple division from the total births and the total population computed as indicated above for the several years of the period covered. The corresponding

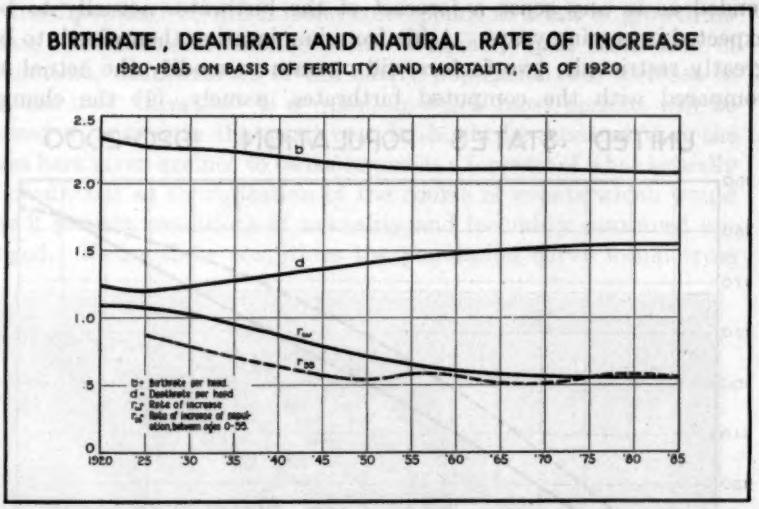

FIG. 1.—Birth rate, death rate, and natural rate of increase, U. S. 1920–1985, computed on basis of fecundity and mortality as of 1920.

death rates follow immediately as the excess of the birth rate over the natural rate of increase. These death rates also are shown in Table 3 and Figure 1. The results thus obtained relate strictly only to the "birthrate of daughters per annum per head of female population." But this figure differs in any case but little from the birthrate as ordinarily computed on the basis of children of both sexes and population of both sexes, and for our present purposes it is not worth while applying a correction.

It serves as a check upon the computation here presented that the final result is in very good agreement with the values of the ultimate birthrate and ultimate natural rate of increase computed by the fundamental formulae:

$$1 = \int_0^\infty e^{-ra}\, p(a)\, m(a)\, da \qquad (1)$$

$$1/b = \int_0^\infty e^{-ra}\, p(a)\, da \qquad (2)$$

given in the references cited above. The values obtained by these

formulae are shown, for comparison, in the last column of Table 3, along with those computed for 1985 and 1980 as described above.

It should be understood that the figures here presented are not intended as in any sense a forecast of the birthrates actually to be expected in coming years. Aside from immigration (henceforth to be greatly restricted), two factors will operate to modify the actual as compared with the computed birthrates, namely, (1) the change

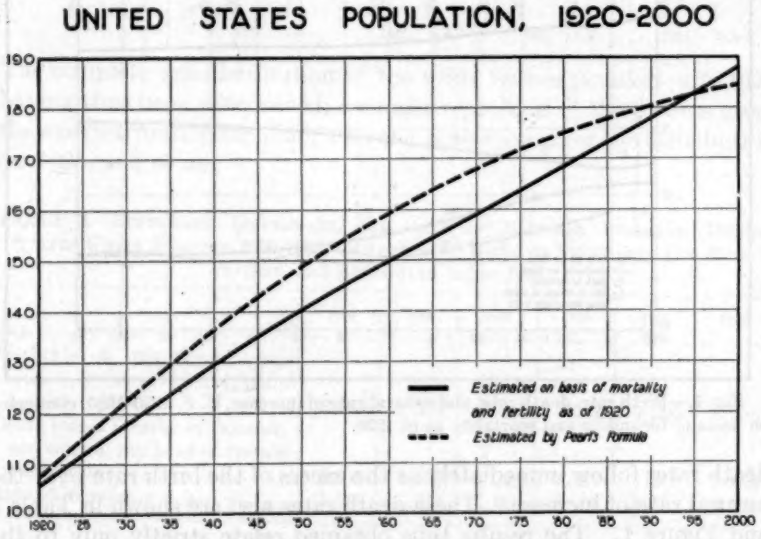

FIG. 2.—U. S. population 1920–2000 computed (a) according to Pearl and Reed's formula; (b) on the basis of fecundity and mortality as of 1920.

(probably decrease) in maternity frequencies; and (2), the change (increase) in survival at all ages, which finds general expression in the increase in the mean length of life. The interest in the figures presented lies in the insight they give into the ultimate age distribution and the resulting birthrates and death rates which would follow from a continuation of *present* conditions of fecundity and survival (mortality); and further, in the information furnished regarding the lapse of time that would be required to bring about adjustment and the successive steps by which this is actually brought about.

It is also interesting to compare the figures thus obtained[7] for the

[7] The total population has in this estimate, been obtained by multiplying the white female population by the factor 2.28 which represents the ratio of total to white female population in 1920.

total population with the forecast given by the formula of Pearl and Reed. This comparison is shown in Figure 2. As would be expected, for many years to come the computed figures fall short of the Pearl and Reed population, which latter corresponds to a law of growth including the influence of immigration. Whether, upon restriction of immigration, the birthrate of the native population will increase to meet the new "demand" is a question which most persons will be disposed to answer in the negative. It should be repeated that the figures here given are not to be construed as a forecast of what actually will occur, but as an indication of the course of events which would ensue if present conditions of mortality and fecundity continued unchanged. Under these conditions the population curve would cross

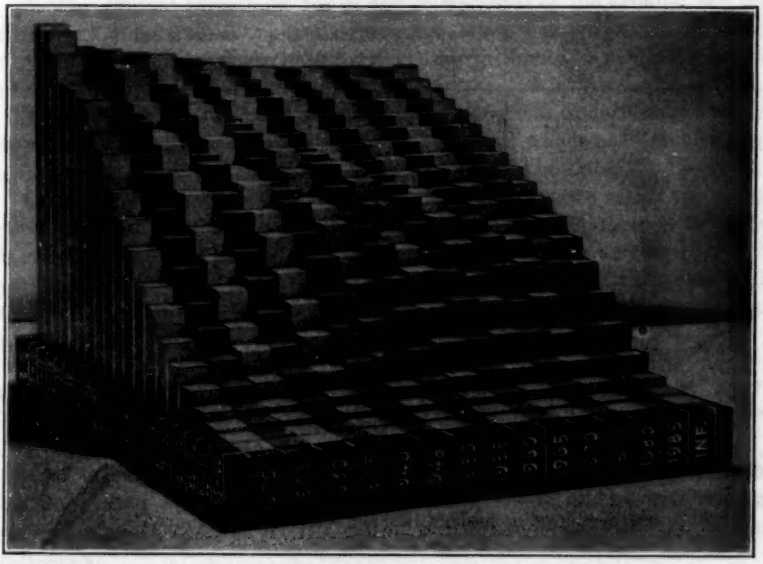

FIG. 3.—Model of age distribution in U. S. population (white females) 1920–1985 computed on basis of fecundity and mortality as of 1920.

the Pearl curve about the year 1995 and the population would thereafter exceed that calculated according to Pearl.

In actual fact, no doubt, fecundity will continue to decline in the future as it has in the past, and the curve of population growth will eventually become less steep than computed for existing conditions.

Another feature brought out by the computation here presented is that the ultimate rate of increase of the population is determined wholly by that part of the female population which is comprised within

reproducing ages, say ten years to fifty-five years. It is, in fact, unnecessary, except as a matter of curiosity, to carry any of the computations described above beyond age fifty-five, if we are interested merely in determining the ultimate rate of increase. If we had omitted all figures above age fifty-five we should have obtained only the results above the double-ruled line in Table 1. On the basis of these alone we should find a series of values for r similar in a general way to that obtained from a consideration of the population as a whole. This is clearly seen in Figure 1, which exhibits graphically the curve of r_ω computed for the entire population, and r_{55}, that computed on the

TABLE 4.—THE "AGEING" OF THE AMERICAN POPULATION

(1)	(2)	(3)
Year	Proportion of Population of Age	
	15–54 years	65 and over
1870*	53.4	3.0
1880	53.7	3.4
1890	55.4	3.7
1900	56.0	4.0
1910	58.0	4.1
1920†	57.1	4.9
1930‡	57.7	5.7
1940	56.7	6.8
1950	55.4	8.0
1960	55.1	8.9
1970	54.6	9.0
1980	54.6	9.4
Ultimate	54.5	9.4
Stationary	55.5	10.5

* 1870 to 1920 persons of both sexes, white and colored.
† 1920 to end, white females of 23 States.
‡ 1930 to end, computed on basis of 1920 age schedule of fecundity.

basis of the population under fifty-five years of age alone.[8] It will be seen that, while individual values of r_{55} and r_ω differ, and while r_ω gives a much smoother curve than r_{55}, yet both curves approach the same asymptote.

The gradual approach, from the initial age distribution in 1920, to that of 1985 (almost identical with the ultimate age distribution) is best seen in a three-dimensional model such as that shown in photographic reproduction in Figure 3. Consecutive quinquennia are

[8] It is, of course, impossible to calculate correctly the ultimate value of r on the basis of a portion of the population, such as age 0–30, which omits an essential part of the reproducing population.

shown alternately in white and black, as an aid to the eye in identifying the quinquennial slices, representing the population by age in 1920 (white), 1925 (black), 1930 (white), etc. The last white slice is labeled "Infinity," and corresponds to the "ultimate" age distribution determined by the 1920 mortality (life table) and age schedule of maternity frequency.

The model clearly exhibits the following features:

1. The *increase* in the proportion of older persons from 1920 to later dates. Note the upward stepping of the blocks from left to right near the front of Figure 3.

2. The *decrease* in the proportion of younger persons. Note the "sky line" at the top. This also indicates the decreasing birthrate. This gradual ageing of the population is also clearly brought out in Table 4.

3. The gradual smoothing out of the roughnesses of the original age distribution (on left), until finally the "smooth" *ultimate* distribution is reached.

4. In the 65 years from 1920 to 1985 the "ultimate" age distribution is practically attained.

The gradual "ageing" of the population referred to under 1 and 2 above appears essentially as a continuation of a process which has actually been going on for many years past, as shown in column 3 of Table 4.

Column 2 of this table, on the other hand, shows that we may expect only comparatively little change in the proportion of the population comprised between the ages of 15 and 55, the essentially productive and reproductive period of life. There will tend to be fewer children, more "old" people (65 and over), but about the same number of persons in the middle ranges of life.

GEOLOGY.—*The restoration of* Ostrea multilirata *Conrad, 1857.*[1]

JULIA A. GARDNER. U. S. Geological Survey.

The possibility of the identity of *Ostrea tasex* Gardner with the earlier *Ostrea multilirata*[2] Conrad was suggested in the original description of *O. tasex*. At that time I discussed their relationship as follows:[3]

> *Ostrea tasex* is probably identical with *Ostrea multilirata* Conrad, collected from the so-called Cretaceous of "Dry Creek, Mexico." Conrad's types are in the National Museum and are fairly well preserved. Nothing of the kind has been reported from the Cretaceous by later investigators who have collected extensively in the Rio Grande area. However, *Ostrea cortex*, col-

[1] Received October 1, 1926.

[2] CONRAD, T. A., U. S. and Mex. Boundary Survey Rept. 1: (pt. 2) 157, *pl. 12, figs. 1a-d.* 1857.

[3] GARDNER, JULIA, U. S. Geol. Survey Professional Paper 131: (D) 109. 1923.

lected at the same locality, is certainly a Cretaceous species, and until "Dry Creek" can be definitely located and the confusion in the stratigraphic relations cleared the Wilcox form may well be kept apart.

When I was working out from Eagle Pass in the summer of 1925, I attempted to locate "Dry Creek," obviously a translation if the *Ostrea* in question really came from the Mexican side, and a descriptive term applied to a large percentage of the arroyos of southwest Texas and the adjoining section of Mexico. Not even the oldest ranchman with his thorough familiarity with local names in years long past could give me any helpful information and I am convinced that Conrad's *Dry Creek* has no standing as a geographic term. As many of his boundary localities are rather confused, it is quite possible that his species did not come from the Mexican side at all but from the Texas. The drainage upon the Texas side contributes readily to the co-mingling of the Wilcox and Cretaceous species. In southern Maverick County, about 28 miles southwest of Eagle Pass, I found collecting conditions which may very well have been similar to those which caused Conrad's confusion. Tobar arroyo twists from Tobar tank about 2 miles north of the Windmill Ranch House to the Rio Grande, a distance of about ten miles by stream bed. It is dry during the greater part of the year but becomes a powerful torrent in the sudden heavy rains of that section of the country. The valley is consequently quite deep and the stream bed covered with coarse debris. The upper part of the course cuts the Wilcox and the heavy oyster reef near the base, tearing down the oysters and scattering them about the valley in the greatest profusion. The shells are very resistant and are often protected to a certain extent by the matrix. They continue to be abundant in the stream debris throughout the length of the Midway outcrop and near the Rio Grande, where the arroyo cuts the Cretaceous, they are commonly mingled with *Ostrea cortex*. There is no reasonable doubt, in my opinion, that Conrad collected his *Ostrea cortex* and *Ostrea multilirata* under conditions analogous to those of Tobar arroyo and, though it is most unfortunate that the type locality of Conrad's species can not be definitely located, I do not think that the resulting obscurity is sufficiently great to invalidate his species. I therefore propose that the name *Ostrea tasex* Gardner be suppressed in favor of *Ostrea multilirata* Conrad, 1857.

ORNITHOLOGY.—*Descriptions of nineteen new East Indian passerine birds.*[1] HARRY C. OBERHOLSER, U. S. National Museum.

The following pages contain descriptions of 19 new birds, in the United States National Museum collection, belonging to the passerine families *Hirundinidae*, *Graculidae* (= *Eulabetidae*), *Campephagidae*, *Dicruridae*, *Dicaeidae*, and *Ploceidae*.

Measurements are given in millimeters, and have been taken as in the author's previous papers. Names of colors are based on Ridgway's "Color Standards and Color Nomenclature."

HIRUNDINIDAE

Hypurolepis javanica hypolampra, subsp. nov.

Subspecific characters.—Similar to *Hypurolepis javanica javanica*, of Java, but larger; and with the posterior lower parts lighter, their median portion whitish.

Description.—Type, adult female, No. 179936, U. S. Nat. Mus.; Lafau, Nias Island, Barussan Islands, western Sumatra, March 22, 1903; Dr. W. L. Abbott. Forehead between auburn and chestnut; rest of upper parts metallic bluish slate black; tail chaetura black with a faint greenish sheen, and with subterminal spots of white; wings chaetura black with a faint greenish sheen, passing on the inner margins of the quills to fuscous, the lesser coverts edged with the color of the back; lores black; sides of head and of neck like the back; chin and throat cinnamon rufous, verging a little toward tawny; posterior lower parts dull white, streaked on the sides, flanks, and crissum with brownish drab; lining of wing rather dark hair brown, the feathers with drab edgings.

Measurements of type.—Wing, 103 mm.; tail, 45; exposed culmen, 8.5; tarsus, 10.5; middle toe without claw, 11.

Swallows of this species from Sumatra belong apparently to this race, as probably also do those from the southern Malay Peninsula. This new subspecies seems to be, in its lighter, brighter posterior under surface, sufficiently different from *Hypurolepis javanica domicola* (Jerdon) of southern India.

Hypurolepis javanica mallopega, subsp. nov.

Subspecific characters.—Resembling *Hypurolepis javanica frontalis* (Celebes examples) but averaging somewhat larger; forehead, throat, and middle of posterior lower parts averaging paler; sides and flanks lighter, and averaging also more brownish (less grayish) and more uniform (less spotted) in appearance.

Type.—Adult male, No. 202219, U. S. Nat. Mus.; Mt. Santo Tomas, altitude 5,250 ft., Benguet, Island of Luzon, Philippine Islands, December 31, 1906; Dr. E. A. Mearns; original number, 14642.

Measurements of type.—Wing, 107 mm.; tail, 50; exposed culmen, 8.5; tarsus, 10; middle toe without claw, 10.

The birds of this species from apparently all the Philippine Islands belong to this race.

[1] Received September 20, 1926.

GRACULIDAE

Lamprocorax panayensis eustathis, subsp. nov.

Subspecific characters.—Similar to *Lamprocorax panayensis insidiator*, from Sumatra, but with green of plumage more oily or yellowish.

Description.—Type, adult male, No. 182998, U. S. Nat. Mus.; Kota Bangoen, eastern Borneo, January 30, 1914; H. C. Raven. Entire plumage, excepting the remiges and the rectrices, metallic bottle green with a slight bronzy tinge, the chin and throat with a very slight purplish sheen; remiges and rectrices blackish on their upper surfaces, with steel greenish, bluish, and purplish reflections; lower surface of tail and wings blackish clove brown, the under wing-coverts and axillars margined with metallic green.

Measurements of type.—Wing, 93.5 mm.; tail, 63; exposed culmen, 15.5; height of bill at base, 7.5; tarsus, 20.5; middle toe without claw, 17.

This new race is so much smaller than *Lamprocorax panayensis heterochlorus* of the Anamba Islands that there is no danger of confusing it with that form.

Lamprocorax panayensis alipodis, subsp. nov.

Subspecific characters.—Resembling *Lamprocorax panayensis eustathis*, from the mainland of eastern Borneo, but much larger, and of a much more bluish (less oily or yellowish) green.

Type.—Adult male, No. 182435, U. S. Nat. Mus.; Pulo Pandigang, eastern Borneo, May 2, 1913; H. C. Raven.

Measurements of type.—Wing, 111 mm.; tail, 81; exposed culmen, 19; height of bill at base, 8; tarsus, 23.5; middle toe without claw, 19.

Lamprocorax panayensis nesodramus, subsp. nov.

Subspecific characters.—Resembling *Lamprocorax panayensis rhadinorhamphus*, from Simalur Island, western Sumatra, but feet decidedly larger, other measurements somewhat larger, except bill, which is relatively smaller.

Type.—Adult male, No. 179273, U. S. Nat. Mus.; Pulo Babi, Barussan Islands, western Sumatra, January 13, 1902; Dr. W. L. Abbott.

Measurements of type.—Wing, 103 mm.; tail, 65.5; exposed culmen, 15.5; height of bill at base, 8; tarsus, 23; middle toe without claw, 18.5.

Lamprocorax panayensis halictypus, subsp. nov.

Subspecific characters.—Similar to *Lamprocorax panayensis affinis*, from northeastern India, but smaller, and of a more oily green, without much bronzy purplish sheen.

Type.—Adult male, No. 153845, U. S. Nat. Mus.; Telibon Island, Trang, Lower Siam, March 1, 1896; Dr. W. L. Abbott.

Measurements of type.—Wing, 100 mm.; tail, 66; exposed culmen, 15.5; height of bill at base, 6.5; tarsus, 22; middle toe without claw, 17.5.

The Malay Peninsula bird, here described, differs from *Lamprocorax panayensis insidiator* of Sumatra in larger size, and in the more bronzy tinge of the plumage.

Gracula javana halibrecta, subsp. nov.

Subspecific characters.—Similar to *Gracula javana andamanensis*, from the Andaman Islands, but larger.

Description.—Type, adult male, No. 178596, U. S. Nat. Mus.; Little Nicobar Island, Nicobar Islands, February 27, 1901; Dr. W. L. Abbott. Entire plumage black, excepting a large white spot on the middle of the six outer primaries; middle of crown, the back, and jugulum with a metallic violet or bronzy violet sheen; throat and chin with a dull greenish blue sheen; sides of crown, sides of occiput, all of the lower back, rump, upper tail-coverts, breast, abdomen, thighs, and crissum, with a metallic sheen of dark American green; margins of all the superior wing-coverts, except the greater series, with glossy bluish, greenish, or violet sheen; wing-quills and rectrices with slightly bluish or greenish reflections, excepting the inner webs of the former, which are brownish, and decidedly paler along the basal portion of the inner margins.

Measurements of type.—Wing, 184.5 mm.; tail, 93; exposed culmen, 17.5; height of bill at base, 15; greatest width of lappets, 15; tarsus, 40; middle toe without claw, 27.

CAMPEPHAGIDAE

Artamides sumatrensis messeris, subsp. nov.

Subspecific characters.—Similar to *Artamides sumatrensis sumatrensis*, from Sumatra, but upper and lower parts paler, particularly in the male; size larger.

Description.—Type, adult male, No. 169789, U. S. Nat. Mus.; Trang, Lower Siam, March 3, 1899; Dr. W. L. Abbott. Upper parts between dark gull gray and neutral gray, the forehead, rump and upper tail-coverts paler; tail brownish black; primaries also brownish back; secondaries and tertials, dark neutral gray, the wing-coverts and the basal portions of the outer edges of the wing-quills gray like the back, the outer edges of the secondaries terminally, the outer edges of the primaries medially, and the outer webs of the tertials, gray, similar to the back but lighter: sides of head and of neck like the back; lower parts light neutral gray, slightly darker on the chin and throat, and paling on the abdomen to pallid neutral gray; crissum buffy grayish white, rather broadly barred with neutral gray; under wing-coverts white, barred with blackish outwardly, and with light neutral gray elsewhere.

Measurements of type.—Wing, 158 mm.; tail, 108; exposed culmen, 24.5; height of bill at base, 13; tarsus, 23.5; middle toe without claw, 19.5.

Artamides sumatrensis nesiarchus, subsp. nov.

Subspecific characters.—Similar to *Artamides sumatrensis sumatrensis*, from Sumatra, but larger; in the female with less white (more gray) on rump, and with slightly heavier black bars on posterior lower parts, particularly the crissum.

Type.—Adult male, No. 180225, U. S. Nat. Mus.; Pulo Parit, near Karimon Island, eastern Sumatra; June 11, 1903; Dr. W. L. Abbott.

Measurements of type.—Wing, 160 mm.; tail, 107.5; exposed culmen, 28; height of bill at base, 12.5; tarsus, 24.5; middle toe without claw, 19.

Although this subspecies is geographically intermediate between *Artamides sumatrensis sumatrensis* of Sumatra and *Artamides sumatrensis messeris* of the Malay Peninsula, it is larger than either, and further differs from the latter, in the male, by reason of darker coloration above and below, and more ashy (less whitish), usually less numerously and less distinctly barred, under tail-coverts; in the female by reason of somewhat darker coloration, less white

on the rump and upper tail-coverts, and somewhat narrower white bars on the abdomen and lower breast.

DICRURIDAE

Dissemurus paradiseus mallomicrus, subsp. nov.

Subspecific characters.—Similar to *Dissemurus paradiseus rangoonensis* from Burma, but smaller, crest shorter, and racquet broader and longer.

Description.—Type, adult male, No. 178660, U. S. Nat. Mus.; Hastings Island, Mergui Archipelago, December 11, 1900; Dr. W. L. Abbott. Entire plumage brownish black, all the exposed parts of the body plumage, except on the chin, throat, abdomen, and flanks, glossy metallic greenish or bluish, this on the breast taking the form of apical spots; wings and tail somewhat shiny brownish black, the rectrices and remiges with their outer webs mostly metallic greenish or bluish; the exposed surface of the upper wing-coverts similar.

Measurements of type.—Wing, 152.5 mm.; tail, 342; tail except racquet feathers, 145; length of racquet, 100; greatest width of racquet, 20; total culmen, 32.5; height of bill at base, 13.5; longest feather of frontal crest, 22; tarsus, 24.5.

This subspecies is apparently confined to the Mergui Archipelago.

Dissemurus paradiseus hypoballus, subsp. nov.

Subspecific characters.—Similar to *Dissemurus paradiseus mallomicrus*, from the Mergui Archipelago, but readily distinguishable by smaller size, shorter frontal crest, and smaller racquet.

Type.—Adult male, No. 153820, U. S. Nat. Mus.; Prahmon, Trang, Lower (Peninsular) Siam, April 1, 1896; Dr. W. L. Abbott.

Measurements of type.—Wing, 149.5 mm.; tail, 350.5; tail except racquet feathers, 143; total culmen, 28.5; height of bill at base, 11; tarsus, 24.5; length of racquet, 78; greatest width of racquet, 21.5; longest feather of frontal crest, 16.5.

This race differs from *Dissemurus paradiseus paradiseus*, of Siam, in shorter wing, much shorter frontal crest, and much smaller racquet. It occupies the Malay Peninsula south of Tenasserim, but not the island of Singapore.

For this bird Mr. E. C. Stuart Baker has used[2] the name *Dissemurus paradiseus setifer* (Cabanis);[3] but an examination of the basis of this name shows it to be unavailable for use in this connection. It is introduced, without any description, and without citation other than as follows:

"599.1. D. setifer *Nob.*—

Edolius setifer (err. retifer) Temm.—*Java; Sumatra.* Mas. ad. et *Jun.*; Fem. 3 St."

It is thus evidently not intended as a new name but as merely the adoption of Temminck's *Edolius setifer* as the name for the birds that Cabanis had in hand. In fact, the only thing that could save it from being an absolute nomen nudum is the citation "*Edolius setifer* (err. retifer) Temm."; and it must be

[2] Novitates Zoologicae **25**: (No. 1) 300. May 1, 1918.

[3] *D[issemurus]. setifer* Cabanis, Mus. Hein **1**: 111. 1851 (after October 23).

thus of identical application. Temminck proposed the name *Edolius retifer* as follows:[4] "Le *Drongo à raquettes* que nous proposons de nommer *Edolius retifer* en remplacement de *Lanius malabaricus*." Later in the same work[5] he emended it to *Edolius setifer*. Thus both *Edolius retifer* Temminck and *Edolius setifer* Temminck are pure synonyms of *Lanius malabaricus* Latham, which is *Dissemurus paradiseus malabaricus* (Latham). Consequently *Dissemurus setifer* Cabanis, which as above shown, is based wholly on these names of Temminck's, must likewise be a synonym of the same, and as such is, of course, not usable for the Malay Peninsula subspecies.

Neither is [*Edolius*] *Malayensis*, applied by Jerdon[6] to this drongo, a tenable name for the Malay race, since this is, though cited as its name, merely a mistaken identification of *Chaptia malayensis* Blyth,[7] which is not a *Dissemurus* at all, but *Chaptia aenea malayensis*.

Under these circumstances, the present form seems properly above provided with a new subspecific title.

Dissemurus paradiseus messatius, subsp. nov.

Subspecific characters.—Similar to *Dissemurus paradiseus hypoballus*, but racquet narrower and crest shorter.

Type.—Adult male, No. 170451, U. S. Nat. Mus.; Selitar, 9 miles from the town of Singapore, Singapore Island, Federated Malay States, May 29, 1899; Dr. W. L. Abbott.

Measurements of type.—Wing, 148.5 mm.; tail, 312; tail except racquet feathers, 148; length of racquet, 82; greatest width of racquet, 18; total culmen, 32; height of bill at base, 11.5; longest feather of frontal crest, 9; tarsus, 24.

It is apparently confined to the island of Singapore.

Dissemurus paradiseus siakensis, subsp. nov.

Subspecific characters.—Resembling *Dissemurus paradiseus messatius*, of Singapore, but racquet averaging smaller; frontal crest shorter (practically absent), stiffer, and denser.

Type.—Adult male, No. 181264, U. S. Nat. Mus.; Siak River, eastern Sumatra, December 22, 1906; Dr. W. L. Abbott.

Measurements of type.—Wing, 142.5 mm.; tail, 357.5; tail except racquet feathers, 145; length of racquet, 69; greatest width of racquet, 17; total culmen, 32.5; height of bill at base, 12; longest feather of frontal crest, 6; tarsus, 21.

The distribution of this race includes the eastern coast region of Sumatra and at least the near-by islands.

[4] Nouv. Rec. Planches Col. d'Oiseaux **3** (livr. 30): texte to pl. 178, p. [1]. January, 1823.

[5] Nouv. Rec. Planches Col. d'Oiseaux **1** (livr. 102): Tableau Methodique. 20. January 29, 1839.

[6] Birds of India, **1**: 438. 1862.

[7] *Ch[aptia]. malayensis* Blyth (A. Hay Ms.), Journ. Asiatic Soc. Bengal, **15**: 294. 1846 (after April). ("Malacca.")

Dissemurus paradiseus colpiotes, subsp. nov.

Subspecific characters.—Similar to *Dissemurus paradiseus siakensis* of eastern Sumatra, but with frontal crest thinner, the feathers, particularly on the anterior portion, broader, less bristly, and usually longer; racquet shorter; and bill somewhat heavier.

Type.—Adult male, No. 179245, U. S. Nat. Mus.; Loh Sidoh Bay, northwestern Sumatra. November 6, 1901; Dr. W. L. Abbott.

Measurements of type.—Wing, 148 mm.; tail, 306;[8] tail except racquet feathers, 136; length of racquet, 63.5; greatest width of racquet, 17.5; total culmen, 31; height of bill at base, 13.5; longest feather of frontal crest, 9.5; tarsus, 23.5.

This race of western Sumatra seems to be distinguishable from all the subspecies of the islands of the Barussan chain, as well as from the form of the species inhabiting eastern Sumatra.

DICAEIDAE

Dicaeum trigonostigmum pagense, subsp. nov.

Subspecific characters.—Similar to *Dicaeum trigonostigmum croceoventre* (Borneo specimens), but upper parts including back and rump lighter; rump more yellowish (less orange); throat paler.

Description.—Type, adult male, No. 180065, U. S. Nat. Mus.; South Pagi Island, Barussan Islands, western Sumatra, November 16, 1902; Dr. W. L. Abbott. Pileum and cervix green-blue slate, the cervix a little darker; scapulars and upper tail-coverts of the same color, but a little mixed or tinged with olive; back mikado orange; rump bright analine yellow; tail black, slightly brownish and with a slightly metallic bluish sheen; wings between dark mouse gray and blackish mouse gray, margined with the color of the scapulars, except the secondary coverts which are rather deep delft blue; sides of head like the crown, but the cheeks duller; sides of neck like the cervix; chin and throat, light neutral gray; breast and sides, orange; flanks and abdomen, cadmium yellow, but the middle of lower abdomen and under tail-coverts wax yellow; lining of wing white.

Measurements of type.—Wing, 48.5 mm.; tail, 23; exposed culmen, 9.5; tarsus, 13; middle toe without claw, 8.

This race is distinguishable from *Dicaeum trigonostigmum cyprum,* of Nias Island, by its paler upper surface, and more yellowish (less orange) rump and crissum.

PLOCEIDAE

Uroloncha acuticauda lepidota, subsp. nov.

Subspecific characters.—Similar to *Uroloncha acuticauda acuticauda,* from India, but upper parts less rufescent (more grayish); auriculars more conspicuously spotted with white; feathers of sides of throat and of breast, with breast and jugulum, broadly margined with whitish or buffy, giving to these parts a much squamate appearance; posterior lower parts more noticeably streaked.

Description.—Type, adult male, No. 154014, U. S. Nat. Mus.; Tyching, Trang, Lower Siam, May 23, 1896; Dr. W. L. Abbott. Crown dark

[8] Racquet feathers not fully grown.

fuscous; rump brownish white; upper tail-coverts clove brown, edged with buffy brown and streaked with white; remainder of upper parts olive brown streaked with white; tail brownish black; wings fuscous, exteriorly edged with fuscous back, the inner edges of the secondaries pinkish buff; nasal plumes, lores, periophthalmic region, and cheeks, brownish black; auriculars between saccardo umber and sayal brown, flecked with whitish; sides of neck olive brown with dull buffy white edges; chin and throat, brownish black, becoming more brownish posteriorly, and the feathers everywhere with buffy or tawny squamate edges; crissum and thighs between snuff brown and saccardo umber, streaked wtth buffy whitish; lower breast, abdomen, sides, and flanks, grayish white, streaked and mottled with smoke gray; edge of wing brownish black; lining of wing pinkish buff, anteriorly cinnamon buff.

Measurements of type.—Wing, 49 mm.; tail, 42.5; exposed culmen, 10.5; tarsus, 16; middle toe without claw, 11.3.

Uroloncha acuticauda phaethontoptila, subsp. nov.

Subspecific characters.—Similar to *Uroloncha acuticauda squamicollis*, from China,[9] but upper parts, chin, and throat, lighter, more rufescent; jugulum, upper breast, sides of head and of neck, lighter; posterior lower surface less distinctly streaked.

Type.—Adult, No. 37817, U. S. Nat. Mus.; northern Formosa, March, 1862; H. B. Tristram.

Measurements of type.—Wing, 48 mm.; tail, 39; exposed culmen 10.3; tarsus, 13; middle toe without claw, 11.5.

Formosan individuals of *Uroloncha squamicollis*, which is a subspecies of *Uroloncha acuticauda*, are sufficiently differentiated to be considered representative of a different subspecies. Whether or not this race occurs elsewhere than on the island of Formosa our material does not show.

Munia maja simalurensis, subsp. nov.

Subspecific characters.—Similar to *Munia maja leucocephala* from Sumatra, but anterior lower parts lighter.

Description.—Type, adult male, No. 179369, U. S. Nat. Mus.; Simalur Island, Barussan Islands, western Sumatra, November 22, 1901; Dr. W. L. Abbott. Head creamy white; rest of upper parts walnut brown; upper tail-coverts metallic claret brown; tail dark vinaceous drab, with edges of metallic claret brown; wings between fuscous and benzo brown, the tertials and the external edgings of the rest of the wing feathers walnut brown like the back, the edge of wing lighter; chin white; throat vinaceous buff; jugulum dull wood brown; middle of breast, middle of abdomen, together with the flanks and crissum, brownish black; sides of breast and of body rather light walnut brown; lining of wing and inner edgings of the secondaries cinnamon buff.

Measurements of type.—Wing, 52.5 mm.; tail, 33; exposed culmen, 11.5; tarsus, 15; middle toe without claw, 14.

This race is known from only Simalur Island.

Munia maja zapercna, subsp. nov.

Subspecific characters.—Similar to *Munia maja leucocephala*, from Sumatra, but larger, with upper parts darker, less rufescent; and with lower parts darker.

[9] Type from Chingchow, Szechuan, China (C. CHUBB, *in litt.*).

Type.—Adult male, No. 220192, U. S. Nat. Mus., Sawarna, Wynkoop's Bay, Bantam, Java, November 2, 1909; William Palmer; original number, 1944.

Measurements of type.—Wing 56 mm.; tail, 39; exposed culmen, 12; tarsus, 16; middle toe without claw, 15.

This subspecies may be distinguished from *Munia maja simalurensis*, of Simalur Island, western Sumatra, by its larger size, and darker, less rufescent coloration, both above and below.

With the above-made additions, the recognizable subspecies of *Munia maja* are:

1. *Munia maja maja* (Linnaeus). Malay Peninsula.
2. *Munia maja leucocephala* (Raffles). Sumatra and the island of Nias.
3. *Munia maja simalurensis* Oberholser. Simalur Island, Barussan Islands, western Sumatra.
4. *Munia maja zapercna* Oberholser. Java.

ETHNOGRAPHY.—*Source of the name Shasta.*[1] C. HART MERRIAM, Washington, D. C.

The source of the name Shasta seems to have been long overlooked. Stephen Powers failed to learn anything about it, and was equally unsuccessful in his attempt to ascertain the name by which the Shaste Indians designate their own tribe.[2]

Roland Dixon, in his valuable work on the "Shasta" (1907) says of the name, that its origin and meaning "are both obscure," and even suggests that it may have been derived from the name of an old man "whose personal name was Shastika (Sŭstī'ka)." At the same time Dixon was aware that the name was "in use by both *Achomā'wi* and *Atsugē'wi*," but for some unknown reason concluded that "it is not a term for the Indians of this stock [Shastan] in the languages of the surrounding stocks."[3] Nevertheless Gatschet, in his Klamath Dictionary, published in 1890, specifically states that the Klamath name for the Shaste is *Shasti* (alternate *Sasti*), and adds that "the usual form *Shasta* is a corruption of *Shasti*."[4] And, as well known, the Klamath tribe (*Lutuame*) adjoins the Shaste tribe on the east.

[1] Received September 15, 1926.

[2] POWERS, *Tribes of California*, p. 243, 1877.

[3] DIXON, ROLAND B. The Huntington California Expedition, *The Shasta*. Bull. Amer. Mus. Nat. Hist. 17: (Pt. 5) 384, July, 1907.

[4] GATSCHET, A. S. *Dictionary of the Klamath Language*, p. 290, 1890. Gatschet gives the forms *Saşti* and *Shasti* as interchangeable, adding that the Klamath Lake people call the members of the Shasti tribe *Sástiam maklaks*.

The name given me for the Shaste by the Pit River Achomawe is *Sas-te'-che* (alternate *Shas-te'-che*).

But Dixon's paper was published three years before the publication of Peter Skene Ogden's "Snake Expedition Journal" of 1826–1827 in which the matter is settled once for all. Peter Ogden, one of the most indomitable and determined of the remarkable series of leaders of the Hudson Bay Fur Company's explorers and trappers, spent a couple of months in the pursuit of beaver in the Klamath Lakes country, after which he moved westerly or northwesterly to the upper waters of Rogue River, where, under date of Feb. 10, 1827, his Journal contains the following entry: "Here we are among the Sastise. Course this day west. The stream we are on [Rogue River] has no connection with the Clammitte River [Klamath]; it flows south then west to a large river. These Indians know nothing of the ocean."[5]

Four days later he writes: "I have named this river Sastise River. There is a mountain equal in height to Mount Hood or Vancouver, I have named Mt. Sastise [Mt. Pitt, west of the main Klamath Lake]. I have given these names from the tribes of Indians."[6]

Under date of March 9 he spells the name *Sasty*, saying: "At early hour with aid of 2 small canoes crossed over Sasty River, all safe over by 4 P.M." And again, on the 13th: "We left the Sasty Forks in our rear."[7]

The earliest appearance of the name in print, so far as known, as in Arrowsmith's "Map of British North America" published in 1832 (2d ed. 1834, in J. Arrowsmith's London Atlas). This map shows "*Shasty River*" well north of the "*Clamet*" [Klamath], occupying the course of the turbulent stream now known as Rogue River. Charles Wilkes in his "Map of the Oregon Territory," 1841, follows Arrowsmith in adopting Ogden's name *Sasty* (but spelling it *Shaste*) for Rogue River. The same is true of Gallatin's "Ethnographical Map of Oregon" [1848][8] from Hale's "Ethnology of the American [Wilkes] Exploring Expedition."

T. C. Elliott, in an editorial footnote on page 213 of Ogden's Journals, mistakes the Shasty River of Ogden and Wilkes (which is in Oregon) for Pit River (incorrectly spelled Pitt) which is in California.

That the upper part of Rogue River is the *Sastise* (or *Sasty*) River of Ogden is obvious not only from Ogden's own account of his move-

[5] OGDEN, PETER SKENE. *Snake Expedition Journal*, 1826–1827. (As copied by Miss Agnes C. Laut in 1905 from original in Hudson's Bay Co. House, London, England.) Quarterly, Oregon Historical Soc., 11: (No. 2) 213, June, 1910.

[6] Ibid., p. 214.

[7] Ibid., p. 216.

[8] Trans. Amer. Ethnological Soc., New York, vol. 2, 1848.

ments but also from the maps of Arrowsmith (1832 and 1834), Wilkes (1841), and Gallatin (1848), this part of which is avowedly based on information from Ogden.

In 1835, Michel L. Framboise, a French-Canadian trapper and interpreter, gave Dr. Gairdner, then stationed at Fort Vancouver, a list of Indian tribes which includes both *"Clamet"* and *"Sasty."* Of the location of the latter tribe he says, "On a river of the same name to the west of No. 30. [No. 30 is the *"Clamet."*][9] La Framboise, in common with other Hudson Bay trappers of the time, was of course familiar with Ogden's names.

Prior to 1851 much confusion existed in relation to the courses of the rivers of southwestern Oregon and northern California. Bonneville's Map of 1837, entitled "The Territory West of the Rocky Mountains," puts the name *"Claymouth"* on Rogue River for its entire course—ten years after it had been named *Sasty* or *Sastise* by Peter Ogden.

Several maps issued in the forties and early fifties show the upper reaches of Klamath River in approximately the correct position, but follow Bonneville, Hale, and others in deflecting the middle course to the northwest, making it a tributary of Rogue River. But B. F. Butler's "Map of the State of California" showing the Gold Region, published in San Francisco in 1851, reverses the usual practice by showing the upper part of Klamath River as rising from the western slopes of Mt. Pitt in Oregon, thus confusing it with the *Sasty* River of Ogden [Rogue River], which is made to flow southwesterly [across the Siskiyou Mountains!] to reach the proper lower course of Klamath River in northern California; while the actual upper part of Klamath River is labeled *Shaste River!*

The earliest map I have examined in which the name Shasta River appears on the stream now known by that name—a tributary to Klamath River from the south—is a manuscript "Sketch Map of the Northwest part of California," drawn by George Gibbs in 1851 (photostat in my possession from original in Indian Office).

It has been shown that the word Saste is the Klamath (Lutuami) name for the tribe which since the publication of Hale's "Ethnography" 80 years ago has been commonly known as Saste (Shaste, or Shasta). It is known also that Peter Skene Ogden after spending two months among the Klamath Indians in the winter of 1826–1827,

[9] *Notes on the Geography of the Columbia River* by the late Dr. GAIRDNER. Journ. Royal Geogr. Soc. London, 11: 256, 1841.

and consequently familiar with their name for the adjoining tribe on the west, entered the territory of that tribe and deliberately gave its name to the river on which he found them [now known as Rogue River], and to the great mountain at its head [now known as Mt. Pitt]. It is one of the tragedies of geographic nomenclature that these names, by reason of a break in the continuity of local knowledge of the region, have been transferred to features remote from those upon which they were originally bestowed. Still, it is something to be thankful for—from the standpoint of anthropology—that both the great mountain and the river to which the name was transferred are still within or bordering on the territory of the Shaste tribe.

While the name of the tribe is now firmly established as *Shaste* (or *Shasta*), it should be kept in mind that this is *not* the name by which members of the tribe call themselves. Their name for themselves is *Ge'-kahts* or *Ke'-katch* (once given me as *Gik'-kahtch*). Roland Dixon got it in the form *Kikatsik*.

ARCHEOLOGY.—*Ancient soapstone quarry in Albemarle County, Virginia.*[1] DAVID I. BUSHNELL, Jr., Washington, D. C.

Steatite, often called soapstone, is encountered in many localities from Georgia and Alabama northward through the eastern states to the Canadian boundary and beyond. It was known to the Indians long before the coming of Europeans, and as it was easily quarried with the use of the crudest of stone implements it was obtained and employed by them in making bowls, tobacco pipes, and ornaments of various sorts.

The extent of the use of soapstone by the Indians is indicated by the large number of ancient quarries located in different parts of the region in which it occurs, and seldom are masses of the stone discovered without finding traces of their work—evidence of the use of stone tools on the exposed surfaces. But necessarily such sites vary greatly in size, and although the more extensive were probably visited and revisited through generations others were far less important and appear to have furnished material for very few objects.

A quarry of much interest, one where many soapstone vessels had been made by the Indians, was discovered some years ago when Connecticut avenue, in the city of Washington, was opened, about one half mile north of the present bridge over Rock Creek. This was quite similar to others at that time known to exist in different parts of

[1] Received October 5, 1926.

the country, many of which were described by Holmes in the Fifteenth Annual Report of the Bureau of Ethnology, Washington, 1897. Other quarries have been discovered since that time, including the one which forms the subject of this note.

Soapstone is found in many parts of the piedmont section of Virginia and in recent years has been quarried extensively in Albemarle and Nelson Counties, localities where it had been obtained by the Indians generations ago, probably long before the settlement of Jamestown. When that part of Virginia first became known to Europeans it was claimed and occupied by Siouan tribes belonging to the Monacan group or confederacy, and one of their most important villages, *Rasawek*, was situated on the banks of the James at the mouth of the Rivanna, some distance to the eastward. But undoubtedly other tribes had occupied or frequented the region before the Siouan people had reached the country east of the mountains, and consequently it is not possible to identify the workers of the ancient quarries.

Very extensive quarries are now being operated by the Virginia Alberene Corporation in the vicinity of Schuyler, Nelson County, and another is about to be opened some two miles in a direct line north of east from Schuyler, on a high ridge a short distance south of Damon in Albemarle County, between five and six miles northwest from the

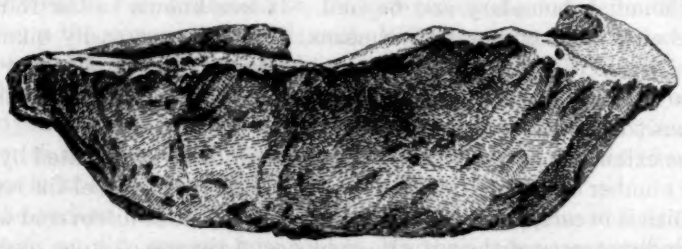

FIG. 1.—(U. S. N. M. 332,023). Unfinished bowl, showing knob at ends, × ½ dia.

nearest point on the James. Through the courtesy of Mr. H. N. Covell, of the Corporation, I was enabled during the past summer to make several visits to this very interesting site. Here great masses of soapstone, outcropping on the surface, follow the general direction from southwest to northeast and have a dip of about 60° to the southeast. The area is heavily timbered, the surface very irregular and broken, with one or more springs near by. For a distance of nearly a thousand feet along the ridge it is possible to trace pits dug by the Indians, generations ago, when getting soapstone. More than twenty

such excavations were discovered, the majority being within the northern half of the distance, and becoming less clearly defined southward. They vary in diameter from ten to thirty feet and at present are from two to four feet in depth, some are distinctly separated while others merge and may in reality be parts of a greater excavation. The surface surrounding the pits is covered with pieces of stone which had evidently been rejected and thrown from the quarries, but now all is covered with thick vegetal mold, the spaces between the pieces are filled, and very little of the stone is visible between the mold and moss. The ancient pits are similarly covered and consequently it was not possible to ascertain the actual extent of the quarries.

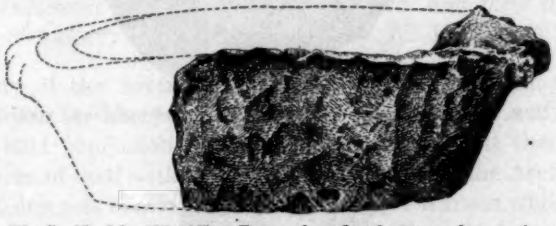

FIG. 2.—(U. S. N. M. 332,025). Part of a flat-bottomed vessel, × ½ dia.

The site gives the appearance of great age and centuries have probably elapsed since it was last worked by the Indians. Many broken vessels have been discovered in the vicinity of the pits, all broken in the process of making and abandoned as useless, but such pieces now prove of interest as they show the marks of the crude stone implements on the rough, unfinished surfaces, and thus reveal the manner in which the vessels were made. The majority appear to have been oval in form with knobs projecting from the narrower ends to serve as handles, a type of vessel which was evidently made extensively in Virginia and Maryland, but of which no finished example is known to exist.

Typical examples of fragments of unfinished bowls collected on the site, in the vicinity of the pits, are shown in the accompanying sketches.

Figure 1 represents a large specimen, very rough, measuring about 17 inches in length. One side had been broken but the knobs remain at both ends. This would probably have had a flat bottom.

Figure 2 shows part of a flat-bottomed bowl with rather straight sides. Handles project from the upper edge as in the preceding.

Two forms of bowls were made, as indicated by the fragments, one had a flat bottom with handles projecting from the upper edge, as represented in figures 1 and 2. The second type may have been

smaller, the bottoms were rounded and the handles extended from the sides an inch or more below the rims.

Figure 3 shows a fragment of a rather small vessel with rounded bottom and sides. The surface was probably finished, ready to be smoothed or polished when broken.

Several quartz implements, used in working the soapstone, were discovered on the surface near one of the northernmost pits. One

FIG. 3.—(U. S. N. M. 332,024). Fragment of a round-bottomed vessel, × ½ dia.

FIG. 4.—(U. S. N. M. 332,027). Crude quartz tool, × ½ dia.

example, a very crude tool which may have been used in preparing the insides of vessels, is shown in figure 4.

Much work was done at this interesting site, quantities of soapstone were removed from the pits and innumerable objects, both large and small were made, but very few have ever been recovered from village sites, mounds or burials.